The Henelec 3 Amp Power Supply

The Henelec 3 amp power supply is a general purpose supply intended for use with Nascom 1 and 2, and similar computers, and in the case of a Nascom is capable of driving systems with up to the equivalent of 48K of dynamic RAM plus 12K of EPROM.

Specifications

220 - 240 volts at 50 watts. AC supply.
+12 volts (+ - 5%) @ 0.5 amp. Max. 30mV ripple
+5 volts (+ - 5%) @ 3 amps. Max. 50mV ripple
-5 volts (+ - 5%) @ 0.5 amp. Max. 30mV ripple
-12 volts (+ - 5%) @ 0.5 amp. Max. 30mV ripple
Ambient range 0 - 70 °C
Heatsink temperature rise 50 °C
Voltage crossover protection

Parts list

D1	100V p.i.v 3A BR94A or equivalent
B2 - 5	100V p.i.v 1A 1N4002 or equivalent
D6 - 9	50V p.i.v 1A 1N4001 or equivalent
IC1	+5V 3A regulator LM323 or equivalent
IC2	+12V 1A regulator 7812 or equivalent
IC3	-5V 1A regulator 7905 or equivalent
IC4	-12V 1A regulator 7912 or equivalent
C1	10000uF 16V electrolytic
C2	1000uF 25V axial lead electrolytic
C3	1000uF 25V axial lead electrolytic
C4	component deleted
C5	10n miniature ceramic
C6	2u2 16V bead tantelum
C7	10n miniature ceramic
C8	2u2 16V bead tantelum
C9	10n miniature ceramic
C10	2u2 16V bead tantelum
C11	10n miniature ceramic
C12	2u2 16V bead tantelum
R1	2R39 - 0R68 10W wire wound resistor
R2	3R9 - 6R8 4W wire wound resistor
R3	8R2 - 12R 4W wire wound resistor
R4	8R2 - 12R 4W wire wound resistor

Sundries

3	4 °C/W TO220 heatsinks
1	1 °C/W TO3 heatsink
1	Printed circuit board 790521
1	Mains transformer 15-0-15V 1A, 0-9V 3A
2	6" Tywraps

Items not supplied

1	4BA solder tag
2	4BA x 0.375" nuts, bolts and washers
3	6BA x 0.250" nuts, bolts and washers
	Connecting and mains leads

Construction

Before commencing construction, decide on the layout of the power supply within the constraints of the case (or whatever) in which the computer is to be mounted. The three major components of the power supply, the mains transformer, the pcb and the main heatsink may be mounted in whatever fashion is desirable, but whilst the mains transformer may be remote from the pcb, the heatsink should not be more that a few inches away from the pcb. Heavy connecting leads should be used thoughout.

The components are mounted on the pcb as shown in the components layout drawing. It is suggested that C1 and the small components are fitted first, take care to observe the polarity of C1, 2, 3, 8, 10 and 12. Note that IC1, C5 and C6 are not mounted on the pcb. When mounting C1 ensure that the 'Tywraps' are tight and that C1 is not able to move. It may be neccessary to enlarge the holes in the pcb for the 'Tywraps' when mounting C1. When mounting the larger components, it helps if the leads are folded over on to the pcb tracks for about 2mm then soldered in place. This way any mechanical shock imposed on the components is transmitted to the pcb without the probability of the soldered joint failing. Fix the ICs to the TO220 heatsinks using 6BA (or M3.5) nuts and bolts. Ensure the ICs are mounted correctly on the heatsinks, and that the ICs are fitted in the correct positions on the pcb. Make sure the heatsinks do not short to other components on the pcb.

IC1 should be mounted centrally on the large heatsink (drilling the heatsink as required), using 4BA (or M4) nuts and bolts. Notice that the two connecting leads are not central. A solder tag should be fitted under the bolt nearest the two connecting leads on the lead side of the heatsink. No insulating washer is required between IC1 and the heat sink, but care should be taken to see that the leads do not touch the heatsink where they pass through the holes. With the connecting leads uppermost, the left hand lead is the input, and the right hand, the output (see detail drawing). The heatsink (via the solder tag) is the ground connection. Solder C5 between the left hand lead and the solder tag, and C6 between the right hand lead and the solder tag, take care to observe the polarity of C6. Connect three leads to IC1 from the points indicated on the layout drawing. All power leads should be of heavy gauge, and be as direct as possible.

The mains transformer may be connected to the appropriate points on the pcb, and the pcb checked for solder splashes, poor joints, etc. If all appears well, connect the mains supply. Using a voltmeter, test for output within the specified figures (note that many Japanese multimeters are inaccurate). If all voltages appear correct, the power supply may be connected to the computer. Although not indicated on the circuit diagram, the mains earth should be connected to the chassis tag on the mains transformer, the 0 volts rail, the system chassis, and the ground connection of the mains filter (if fitted). Check that the outputs are to specification under load.

Fault finding

Failure of any one of the supplies may be investigated with a test meter, however, a cause of failure is the incorrect orientation of D6 - 9, causing two supplies to be shorted together. Given this is not the case, the following may be checked:

In of IC1	9 - 14V
In of IC2	18 - 22V
In of IC3	18 - 22V
In of IC4	18 - 22V

If these voltages are in order, then the appropriate IC may be at fault or a solder splash is shorting the output to another rail or 0V. If one of these voltages is seriously outside the above figures, then the rectifiers smoothing capacitors or series limit resistors should be regarded with suspicion. It is useful to remember that the regulators require an input voltage of at least 2 - 3V in excess of their rated output voltage for correct operation. This may be checked under load conditions, and if found to be low, the appropriate series limit resistor may be reduced accordingly.

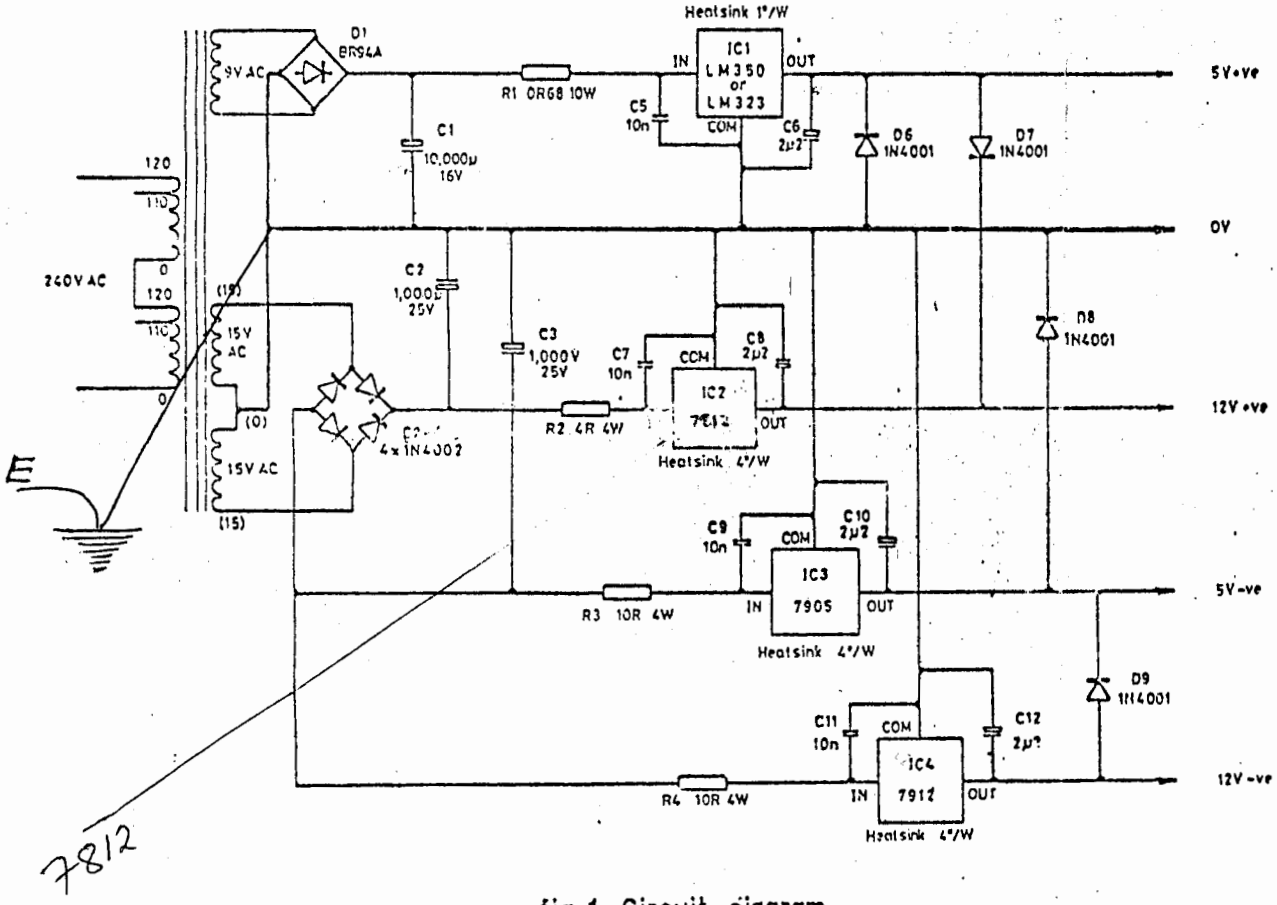

fig.1 Circuit diagram

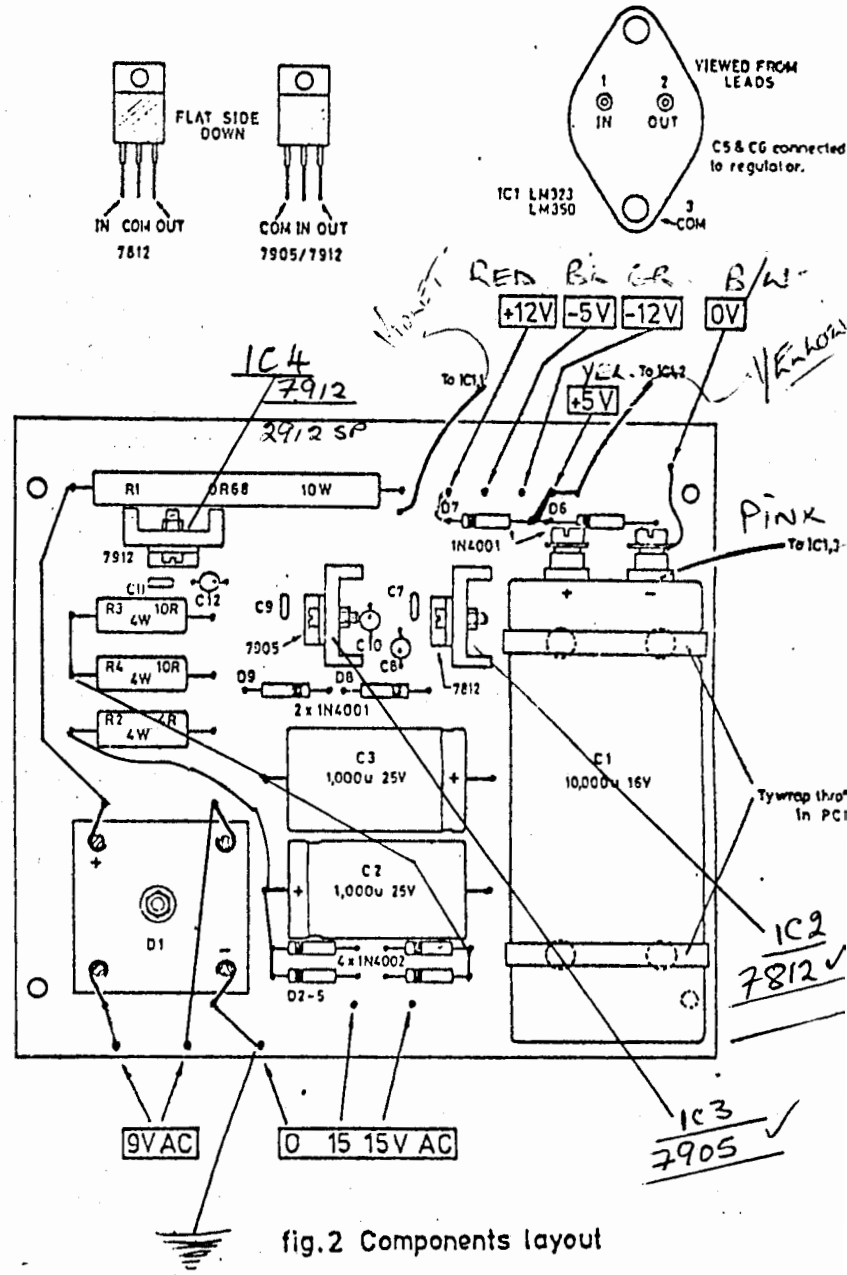

fig.2 Components layout

HENELEC NASCOM 3A P.S.U.

DRAWN D.R.HUNT. 21.5.79

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